INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad -500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE DESCRIPTOR

Course Title	**ANALOG AND PULSE CIRCUITS LABORATORY**				
Course Code	**AECB15**				
Programme	B.Tech				
Semester	IV	ECE			
Course Type	Core				
Regulation	IARE - R18				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	-	-	-	3	2
Chief Coordinator	Ms. K S Indrani, Assistant Professor				
Course Faculty	Dr. VVijay , Assistant Professor Ms. N Anusha , Assistant Professor Mr. S Laxmana chary , Assistant Professor				

I. COURSE OVERVIEW:

This laboratory course builds on the lecture course "Electronic circuit analysis" and “pulse and digital circuits” which is mandatory for all students of electronics and communication engineering. The course aims at practical experience with the characteristics and theoretical principles of linear and non linear devices and pulse circuits.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
UG	AECB06	III	Electronic Devices and Circuits	4

III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Electronic Circuits and Pulse Circuits Lab	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✘	Chalk & Talk	✘	Quiz	✘	Assignments	✘	MOOCs
✔	LCD / PPT	✘	Seminars	✘	Mini Project	✘	Videos
✘	Open Ended Experiments						

V. EVALUATION METHODOLOGY:

Each laboratory will be evaluated for a total of 100 marks consisting of 30 marks for internal assessment and 70 marks for semester end lab examination. Out of 30 marks of internal assessment, continuous lab assessment will be done for 20 marks for the day to day performance and 10 marks for the final internal lab assessment.

Semester End Examination (SEE): The semester end lab examination for 70 marks shall be conducted by two examiners, one of them being Internal Examiner and the other being External Examiner, both nominated by the Principal from the panel of experts recommended by Chairman, BOS.

The emphasis on the experiments is broadly based on the following criteria:

20 %	To test the preparedness for the experiment.
20 %	To test the performance in the laboratory.
20 %	To test the calculations and graphs related to the concern experiment.
20 %	To test the results and the error analysis of the experiment.
20 %	To test the subject knowledge through viva – voce.

Continuous Internal Assessment (CIA):
CIA is conducted for a total of 30 marks (Table 1), with 20 marks for continuous lab assessment during day to day performance, 10 marks for final internal lab assessment.

Table 1: Assessment pattern for CIA

Component	**Laboratory**		**Total Marks**
Type of Assessment	Day to day performance	Final internal lab assessment	
CIA Marks	**20**	**10**	**30**

Continuous Internal Examination (CIE):
One CIE exams shall be conducted at the end of the 16th week of the semester. The CIE exam is conducted for 10 marks of 3 hours duration.

Preparation	**Performance**	**Calculations and Graph**	**Results and Error Analysis**	**Viva**	**Total**
2	2	2	2	2	10

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	Proficiency assessed by
PO 1	**Engineering knowledge**: Apply the knowledgeof mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	Lab related Exercises
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	2	Lab related Exercises
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	2	Lab related Exercises
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	1	Self learning

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 1	**Professional Skills:** An ability to understand the basic concepts in Electronics & Communication Engineering and to apply them to various areas, like Electronics, Communications, Signal processing, VLSI, Embedded systems etc., in the design and implementation of complex systems.	2	Lab related Exercises
PSO 2	**Problem-Solving Skills:** An ability to solve complex Electronics and communication Engineering problems, using latest hardware and software tools, along with analytical skills to arrive cost effective and appropriate solutions.	-	-
PSO 3	**Successful Career and Entrepreneurship:** An understanding of social-awareness & environmental-wisdom along with ethical responsibility to have a successful career and to sustain passion and zeal for real-world applications using optimal resources as an Entrepreneur.	-	-

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES (COs):

The course should enable the students to:	
I	Simulate and analyze single stage and multistage amplifiers and oscillators.
II	Demonstrate the principles of feedback amplifiers and oscillators through simulation.
III	Implementation of circuits for linear and non-linear wave shaping
IV	Analyze the characteristics of different multivibrators.

IX. COURSE LEARNING OUTCOMES (CLOs):

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
AECB15.01	CLO 1	Analyze the frequency response of CE and CB amplifiers and able to understand application from the responses.	PO 1	3
AECB15.02	CLO 2	Understand the multistage amplifier and analyze frequency response of RC Coupled amplifier.	PO 1, PO 12	2
AECB15.03	CLO 3	Analyze the frequency response of tuned amplifier and able to understand application from the responses.	PO 1	3
AECB15.04	CLO 4	Understand the effect of feedback amplifier and output response of it.	PO 1, PO 2	3
AECB15.05	CLO 5	Understand sinusoidal generation without input for RC Phase shift Oscillators and the frequency of output waveform.	PO 2	2
AECB15.06	CLO 6	Understand sinusoidal generation without input for Hartley and colpitts oscillator and able to analyze difference ,frequency of output waveforms .	PO 2, PO 3	2
AECB15.07	CLO 7	Understand difference between voltage and power amplifiers and analyze the power amplifiers like class A and class B.	PO 1, PO 12	3
AECB15.08	CLO 8	Analyze how the filter operation like low pass and high pass is occurring due to simple RC components for different time constants.	PO 1, PO 2	2
AECB15.09	CLO 9	Analyze how the clipping and clamping operation is going on by simple components diodes ,RLC componentsand the importance of it.	PO 1, PO 3	2
AECB15.10	CLO 10	Analyze the Astable multivibrator circuits , understand the applications and evaluate time, frequency parameters	PO 1, PO 2	2
AECB15.11	CLO 11	Analyze the Bistable multivibrator circuits , understand the applications and evaluate time, frequency parameters	PO 1, PO 3	3
AECB15.12	CLO 12	Understand the operation and waveform generation of Schmitt trigger circuit.	PO 1	3
AECB15.13	CLO 13	Understand how comparator operation going on by electronic components.	PO 1	3
AECB15.14	CLO 14	Understand how the transistor works as switch and observe the waveforms of it	PO 1	3

3 = High; 2 = Medium; 1 = Low

X. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

CLOs	Program Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 1	3												2		
CLO 2	2											2			

CLO 3	3												2		
CLO 4	3	3											3		
CLO 5		2											3		
CLO 6		2	2												
CLO 7	3											3	2		
CLO 8	2	2													
CLO 9	2		2										2		
CLO 10	2	2													
CLO 11	3		3										2		
CLO 12	3														
CLO 13	3												2		
CLO 14	3														

3 = High; 2 = Medium; 1 = Low

XI. ASSESSMENT METHODOLOGIES – DIRECT

CIE Exams	PO 1, PO 2 PO 5, PO 12, PSO 1	SEE Exams	PO 1, PO 2 PO 5, PO 12, PSO 1	Assignments	-	Seminars	-
Laboratory Practices	PO 1, PO 2 PO 5, PO 12, PSO 1	Student Viva	PO 1, PO 2 PO 5, PO 12, PSO 1	Mini Project	-	Certification	-
Term Paper	-						

XII. ASSESSMENT METHODOLOGIES - INDIRECT

✔	Early Semester Feedback	✔	End Semester OBE Feedback
✘	Assessment of Mini Projects by Experts		

XIII. SYLLABUS

LIST OF EXPERIMENTS	
Week-1	**BASIC AMPLIFIERS**
Simulate frequency response of common emitter amplifier and common base amplifier.	
Week-2	**TWO STAGE RC COUPLED AMPLIFIER**
Simulate frequency response of two stage RC coupled amplifier.	
Week-3	**SINGLE TUNED AMPLIFIERS**
Simulate a single tuned amplifier.	
Week-4	**FEEDBACK AMPLIFIERS**
Simulate voltage series feedback amplifier and current shunt feedback amplifier.	

Week-5	**RC PHASE SHIFT OSCILLATOR USING TRANSISTOR**
Simulate sine wave generated for a particular frequency by an RC phase shift oscillator.	
Week-6	**OSCILLATORS**
Simulate sine wave generated for a particular frequency by Colpitts and Hartley oscillator..	
Week-7	**POWER AMPLIFIERS**
Simulate class A power amplifier (transformer less) and class B power amplifier.	
Week-8	**LINEAR WAVESHAPING.**
Design RC low pass and high pass circuit for different time constants.	
Week-9	**NON-LINEAR WAVESHAPING**
Design transfer characteristics of clippers and clampers.	
Week-10	**MULTIVIBRATORS ASTABLE**
Design Astable multivibrator and plot its waveforms.	
Week-11	**MULTIVIBRATORS BISTABLE**
Design Bistable multivibrator and plot its waveforms.	
Week-12	**SCHMITT TRIGGER**
Design a Schmitt trigger circuit.	
Week-13	**COMPARATOR**
Design a Comparator and plot its waveforms.	
Week-14	**TRANSISTOR AS A SWITCH**
Design a Switch and plot its waveforms.	

Text Books:

1. Jacob Millman , Christor C Halkias,- Integrated Electronics‖, Tata McGraw Hill, 1st Edition, 2008.
2. David A.Bell," Solid State Pulse Circuits",PHI learing,4th Edition.

Reference Books:

1. David A. Bell ―Electronic Devices & Circuits‖ 5th Edition, Oxford university press, 7th Edition,
2. 2009.
3. Robert L. Boylestad, Louis Nashelsky, ―Electronic Devices and Circuits Theory, Pearson education, 9 th Edition, 2008.
4. Ronald J.Tocci,"Fundamentals of Pulse and Digital Circuits", PHI learning, 3rd Edition, 2008.

XIV. COURSE PLAN:

The course plan is meant as a guideline. Probably there may be changes.

Week No.	Topics to be covered	CLOs	Reference
1	Calculate the frequency response of CE and CB amplifier.	CLO1	T1 13.2
2	Calculate the frequency response of two stage RC Coupled Amplifier	CLO2	T1 14.5
3	Calculate the frequency of Single tuned amplifier.	CLO3	T1 14.8
4	Calculate the frequency response of feedback amplifiers	CLO4	T1 15.5 -15.9
5	Calculate the frequency of oscillations in RC phase shift oscillator.	CLO5	T1 15.17
6	Calculate the frequency of oscillations in Colpitts and Hartley oscillator.	CLO6	T1 15.16
7	Calculate the efficiency of Class A and Class B power amplifiers.	CLO7	T1 16.1,T1 16.8
8	Verify the characteristics of clippers.	CLO8	R4 4.1
9	Verify the transfer characteristics of Clampers.	CLO9	R4 4.2
10	Observe and plot the waveform of Astable Multivibrators	CLO10	R4 4.3
11	Observe and plot the waveform of Bistable Multivibrators	CLO11	R4 4.6
12	Calculate the LTP , UTP and plot the waveform of a Schmitt Trigger circuit.	CLO12	R4 4.10
13	Verify the output waveforms of comparator.	CLO13	R4 5.6
14	Observe the waveforms of Transistor as a switch	CLO14	R4 5.9

XV. GAPS IN THE SYLLABUS - TO MEET INDUSTRY / PROFESSION REQUIREMENTS:

S NO	Description	Proposed actions	Relevance with POs	Relevance with PSOs
1	Every students should understand these basic concepts thoroughly.	Conducting more Labs	PO 1, PO 2	PSO 1
2	Encourage students to do small projects for various applications	Electronics for you	PO 2, PO3	PSO 1

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HOD, ECE